

NAME DATE:.....

INDEX NO. SIGNATURE

233/3
CHEMISTRY
PRACTICAL
PAPER 3
TIME: 2¼ HOURS.

MARKING
SCHEME

LANET JOINT EVALUATION (LANJET 2023)

FORM 4

Kenya Certificate of Secondary Education

INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided above.
- Answer **ALL** the questions in the spaces provided.
- You are not allowed to start working with the apparatus for the first 15 minutes of the 2¼ hours allowed time for the paper.
- Use the 15 minutes to read through the question paper and note the chemicals you require
- Mathematical tables and electronic calculators may be used.
- All working **MUST** be clearly shown where necessary.

FOR EXAMINER'S USE ONLY.

Question	Maximum score	Candidate's score
1	17	
2	17	
3	6	
Total score	40	

This paper consists of 6 printed pages.

Candidates should check to ensure that all pages are printed as indicated and no questions are missing

- ii) Using the graph, determine the temperature at which 63g of solid A would dissolve in 100cm³ of water. (1mk)
51°C ✓
- iii) What is the relationship between temperature increase and solubility of solid A (1mk)

As temperature increases, solubility increases ✓

Procedure II

- e) Transfer the content of boiling tube from procedure I into 250ml volumetric flask, rinse both the boiling tube and thermometer with distilled water then add content into volumetric flask. Add more distilled water to the mark, shake the mixture and label this as solution A.
- f) Fill the burette with solution A then using a clean pipette add 25cm³ of solution B into conical flask, then 3 drops of phenolphthalein indicator. Titrate A against B until the end point record results in table below. Repeat procedure (f) twice to complete table II below.

Table I

	I	II	III
Find burette readings	19.8	39.5	29.8
Initial burette readings	0.0	19.8	10.0
Volume of solution A in (cm ³)	19.8	19.7	19.8

N/B values averaged mult to ±0.2 Ded

*CT ✓
 ΔV ✓
 PA ✓
 A ±0.1 ✓
 ±0.2 ✓
 JA ✓*

- i) Calculate the average volume of solution A (5mks)

$$V_A = \frac{19.8 + 19.7 + 19.8}{3} = 19.8 \text{ cm}^3$$

- ii) Calculate the molarity of solution B in Moles per litre. (1mk)

(Na = 23 H = 1 O = 16)

$$\text{Molarity} = \frac{\text{Mn/L}}{\text{RFM}} = \frac{85 \text{ L}}{(23+16+1)} = 0.2 \text{ M}$$

- iii) Calculate the number of moles of solution B used (1mk)

$$\frac{0.2 \times 25}{1000} = 0.005 \text{ moles } \checkmark$$

- iv) Given that solid A is a dibasic acid with formula H₂X, determine the number of moles of solution A in litre value. (1mk)

Moles ratio 1:2 ∴ = 0.005/2 = 0.0025 moles ✓

- v) How many moles of solution A are there in 250cm³ of solution A. (1mk)

*0.0025 moles ⇒ 19.8 cm³
 ? ⇐ 250 cm*

$$\frac{0.0025 \times 250}{19.8} = 0.03157 \text{ moles } \checkmark$$

- vi) Calculate the relative formula mass of solid A. (1mk)

$$\text{Moles} = \frac{\text{mass}}{\text{RFM}} \therefore \text{RFM} = \frac{45}{0.03157} = 126.7 \checkmark$$

10 + 1

Q2. You are provided with substance C. Carry out the following tests and record your observations and inferences in spaces provided.

a) Describe the appearance of solid C.

White crystalline solid ✓
 N/B colour ✓ (1mk)
 state ✓

b) Place 1/3 of solid C in a boiling tube, heat it gently then strongly.

Observations	Inferences
- Cracking sound/degradation sound. - White solid changed to brown, yellow on cooling. - Brown (1mk) gas produced.	- NO_3^- Present ✓ - Pb^{2+} ✓ (1mk)

each observation ~ 1/2 mk

c) Place the remaining amount of substance C in a boiling tube. Add about 10cm of distilled water and shake the mixture for test (d) below.

Observations	Inferences
White solid dissolved forming colourless solution. ✓ (1mk)	- Soluble Salt/Compound ✓ - Absence of Cu^{2+} , Fe^{2+} , Fe^{3+} ✓ (1mk)

d) Divide the solution obtained in step (c) above into 4 portions.

i) To first portion add 3 drops of lead (II) Nitrate provided in access.

Observations	Inferences
No white precipitate ✓ (1mk)	$\left. \begin{matrix} \text{SO}_4^{2-} \\ \text{SO}_3^{2-} \\ \text{CO}_3^{2-} \\ \text{Cl}^- \end{matrix} \right\} \text{Absent} \checkmark$ (1mk)

All = ✓
 3 = ✓
 1 or 2 = 0.

ii) To the second portion, add drops of Barium Nitrate provided

Observations	Inferences
No white precipitate ✓ (1mk)	$\left. \begin{matrix} \text{SO}_4^{2-} \\ \text{SO}_3^{2-} \\ \text{CO}_3^{2-} \end{matrix} \right\} \text{Absent} \checkmark$ (1mk)

All = ✓
 2 = ✓
 1 = 0.

iii) To third portion add drops of 2M NaOH until in excess.

Observations

Inferences

White precipitate ✓
Soluble in excess ✓
(1mk)

Pb^{2+}
 Al^{3+}
 Zn^{2+} } Present ✓
(1mk)
All = ✓
2 = ✓
1 = 0.

iv) To the last portion, add drops of KI provided in excess.

Observations

Inferences

Yellow precipitate ✓
(1mk)

Pb^{2+} Confirmed ✓
(1mk)

Q3. You are provided with liquid D. Carry out tests below, record your observations and inferences in the spaces provided.

a) Place 1/3 of liquid d on watch glass and ignite it using a burning splint.

Observations

Inferences

Burn with blue non-sooty flame ✓
(1mk)

$C=C$ or $-C\equiv C-$ Absent ✓
(1mk) ignore $-C-C-$

b) To about 1cm of liquid D in a test tube, add about 3cm³ of distilled water and shake.

Observations

Inferences

Liquids are miscible or forms homogenous mixture ✓
(1mk)

D is polar ✓
(1mk)

c) To remaining portion of liquid D add 3 drops of acidified potassium chromate vi warm the mixture and allow it to stand for about 1 minute.

Observations

Inferences

Orange, acidified potassium chromate vi changes to green. ✓
(1mk)

ROH Present ✓
(1mk)